

WHAT IS CLAIMED IS:

1. A process for fusing toner residing on a substrate to the substrate, the process comprising transmitting heat to the toner, and also comprising contacting the toner with the fusing surface layer of a fuser member comprising:

- (a) a base; and
- (b) a fusing surface layer comprising:
 - (i) a fluoroelastomer continuous phase; and
 - (ii) a discontinuous phase dispersed through the fluoroelastomer continuous phase in the form of domains;

wherein, at the temperature of the fusing process:

- the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase; and
- the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great;
- the viscosity of the toner is sufficiently high; and
- the modulus of the discontinuous phase is sufficiently low; and

wherein the discontinuous phase comprises one or both of:

- at least a minimum proportion by volume of the fusing surface layer; and
- at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 10 or less;

the amount of heat transmitted to the toner being sufficient to fuse the toner to the substrate, and insufficient to raise the gloss number of the image above about 10 or less.

2. The process of claim 1, wherein at the equilibrium surface of the fusing surface layer:

- (a) the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase at the temperature of the fusing process;
- (b) the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great at the temperature of the fusing process;
- (c) the modulus of the discontinuous phase is sufficiently low at the temperature of the fusing process; and
- (d) the discontinuous phase comprises one or both of:
 - (i) at least a minimum proportion by volume of the fusing surface layer; and
 - (ii) at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 10 or less.

3. The process of claim 1, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 10 Kpoise.

4. The process of claim 3, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 40 Kpoise.

5. The process of claim 3, wherein the toner comprises crosslinking, and further comprises at least one member selected from the group consisting of styrene-butadiene thermoplastic toner, styrene-butylacrylate thermoplastic toner, and polyester thermoplastic toner.

6. The process of claim 5, wherein the toner comprises a partially crosslinked styrene-butylacrylate toner having, at the temperature of the fusing process, a viscosity of at least about 100 Kpoise.

7. The process of claim 5, wherein the toner comprises a partially crosslinked polyester toner having, at the temperature of the fusing process, a viscosity of at least about 40 Kpoise.

8. The process of claim 1, wherein, at the temperature of the fusing process, the discontinuous phase has a modulus of about 8×10^6 Pa or less.

9. The process of claim 1, wherein the discontinuous phase comprises at least one elastomer.

10. The process of claim 9, wherein the elastomer is selected from the group consisting of silicones, fluorosilicones, fluoroelastomers, and perfluoropolyethers.

11. The process of claim 10, wherein the discontinuous phase comprises a silicone elastomer.

12. The process of claim 11, wherein the silicone elastomer comprises silicone elastomer particulate.

13. The process of claim 1, wherein the discontinuous phase has been prepared from at least one curable polyfunctional poly(C₁₋₆ alkyl)siloxane polymer.

14. The process of claim 1, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 5×10^8 Pa or less.

15. The process of claim 14, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 2×10^8 Pa or less.

16. The process of claim 1, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 2×10^7 Pa or less.

17. The process of claim 16, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 1×10^7 Pa or less.

18. The process of claim 1, wherein, at the temperature of the fusing process, the difference between the logarithm of the modulus of the fluoroelastomer continuous phase and the logarithm of the modulus of the discontinuous phase is at least about 1.0.

19. The process of claim 1, wherein the domains have a mean diameter of at least about 0.5 microns.

20. The process of claim 1, wherein the discontinuous phase comprises at least about 20 parts per 100 parts by weight of the fluoroelastomer continuous phase.

21. The process of claim 1, wherein the discontinuous phase comprises at least about 10 percent by volume of the fusing surface layer.

22. A process for fusing toner residing on a substrate to the substrate, the process comprising transmitting heat to the toner, and also comprising contacting the toner with the fusing surface layer of a fuser member comprising:

- (a) a base; and
- (b) a fusing surface layer comprising:
 - (i) a fluoroelastomer continuous phase; and
 - (ii) a discontinuous phase dispersed through the fluoroelastomer continuous phase in the form of domains;

wherein, at the temperature of the fusing process:

- the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase; and
- the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great;
- the viscosity of the toner is sufficiently high; and
- the modulus of the discontinuous phase is sufficiently low; and

wherein the discontinuous phase comprises one or both of:

- at least a minimum proportion by volume of the fusing surface layer; and
- at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 8 or less;

the amount of heat transmitted to the toner being sufficient to fuse the toner to the substrate, and insufficient to raise the gloss number of the image above about 8 or less.

23. The process of claim 22, wherein at the equilibrium surface of the fusing surface layer:

- (a) the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase at the temperature of the fusing process;
- (b) the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great at the temperature of the fusing process;
- (c) the modulus of the discontinuous phase is sufficiently low at the temperature of the fusing process; and
- (d) the discontinuous phase comprises one or both of:
 - (i) at least a minimum proportion by volume of the fusing surface layer; and
 - (ii) at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 8 or less.

24. The process of claim 22, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 10 Kpoise.

25. The process of claim 24, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 40 Kpoise.

26. The process of claim 24, wherein the toner comprises crosslinking, and further comprises at least one member selected from the group consisting of styrene-butadiene thermoplastic toner, styrene-butylacrylate thermoplastic toner, and polyester thermoplastic toner.

27. The process of claim 26, wherein the toner comprises a partially crosslinked styrene-butylacrylate toner having, at the temperature of the fusing process, a viscosity of at least about 100 Kpoise.

28. The process of claim 26, wherein the toner comprises a partially crosslinked polyester toner having, at the temperature of the fusing process, a viscosity of at least about 40 Kpoise.

29. The process of claim 22, wherein, at the temperature of the fusing process, the discontinuous phase has a modulus of about 8×10^6 Pa or less.

30. The process of claim 22, wherein the discontinuous phase comprises at least one elastomer.

31. The process of claim 30, wherein the elastomer is selected from the group consisting of silicones, fluorosilicones, fluoroelastomers, and perfluoropolyethers.

32. The process of claim 31, wherein the discontinuous phase comprises a silicone elastomer.

33. The process of claim 32, wherein the silicone elastomer comprises silicone elastomer particulate.

34. The process of claim 22, wherein the discontinuous phase has been prepared from at least one curable polyfunctional poly(C₁₋₆ alkyl)siloxane polymer.

35. The process of claim 22, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 5×10^8 Pa or less.

36. The process of claim 35, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 2×10^8 Pa or less.

37. The process of claim 22, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 2×10^7 Pa or less.

38. The process of claim 37, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 1×10^7 Pa or less.

39. The process of claim 22, wherein, at the temperature of the fusing process, the difference between the logarithm of the modulus of the fluoroelastomer continuous phase and the logarithm of the modulus of the modulus of the discontinuous phase is at least about 1.0.

40. The process of claim 22, wherein the domains have a mean diameter of at least about 1 micron.

41. The process of claim 22, wherein the discontinuous phase comprises at least about 30 parts per 100 parts by weight of the fluoroelastomer continuous phase.

42. The process of claim 22, wherein the discontinuous phase comprises at least about 20 percent by volume of the fusing surface layer.

43. A process for fusing toner residing on a substrate to the substrate, the process comprising transmitting heat to the toner, and also comprising contacting the toner with the fusing surface layer of a fuser member comprising:

- (a) a base; and
- (b) a fusing surface layer comprising:
 - (i) a fluoroelastomer continuous phase; and
 - (ii) a discontinuous phase dispersed through the fluoroelastomer continuous phase in the form of domains;

wherein, at the temperature of the fusing process:

- the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase; and
 - the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great;
 - the viscosity of the toner is sufficiently high;
- and
- the modulus of the discontinuous phase is sufficiently low; and

wherein the discontinuous phase comprises one or both of:

- at least a minimum proportion by volume of the fusing surface layer; and
- at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 6 or less;

the amount of heat transmitted to the toner being sufficient to fuse the toner to the substrate, and insufficient to raise the gloss number of the image above about 6 or less.

44. The process of claim 43, wherein at the equilibrium surface of the fusing surface layer:

- (a) the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase at the temperature of the fusing process;
- (b) the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great at the temperature of the fusing process;
- (c) the modulus of the discontinuous phase is sufficiently low at the temperature of the fusing process; and
- (d) the discontinuous phase comprises one or both of:
 - (i) at least a minimum proportion by volume of the fusing surface layer; and
 - (ii) at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 6 or less.

45. The process of claim 43, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 10 Kpoise.

46. The process of claim 45, wherein, at the temperature of the fusing process, the toner has a viscosity of at least about 40 Kpoise.

47. The process of claim 45, wherein the toner comprises at least one member selected from the group consisting of styrene-butadiene thermoplastic toner, styrene-butylacrylate thermoplastic toner, and polyester thermoplastic toner.

48. The process of claim 47, wherein the toner comprises a partially crosslinked styrene-butylacrylate toner having, at the temperature of the fusing process, a viscosity of at least about 100 Kpoise.

49. The process of claim 47, wherein the toner comprises a partially crosslinked polyester toner having, at the temperature of the fusing process, a viscosity of at least about 40 Kpoise.

50. The process of claim 43, wherein, at the temperature of the fusing process, the discontinuous phase has a modulus of about 8×10^6 Pa or less.

51. The process of claim 43, wherein the discontinuous phase comprises at least one elastomer.

52. The process of claim 51, wherein the elastomer is selected from the group consisting of silicones, fluorosilicones, fluoroelastomers, and perfluoropolyethers.

53. The process of claim 52, wherein the discontinuous phase comprises a silicone elastomer.

54. The process of claim 53, wherein the silicone elastomer comprises silicone elastomer particulate.

55. The process of claim 43, wherein the discontinuous phase has been prepared from at least one curable polyfunctional poly(C₁₋₆ alkyl)siloxane polymer.

56. The process of claim 43, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 5×10^8 Pa or less.

57. The process of claim 56, wherein, at the temperature of the fusing process, the fluoroelastomer continuous phase has a modulus of about 2×10^8 Pa or less.

58. The process of claim 43, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 2×10^7 Pa or less.

59. The process of claim 58, wherein, at the temperature of the fusing process, the fusing surface layer has a modulus of about 1×10^7 Pa or less.

60. The process of claim 43, wherein, at the temperature of the fusing process, the difference between the logarithm of the modulus of the fluoroelastomer continuous phase and the logarithm of the modulus of the discontinuous phase is at least about 1.0.

61. The process of claim 43, wherein the domains have a mean diameter of at least about 2 microns.

62. The process of claim 43, wherein the discontinuous phase comprises at least about 40 parts per 100 parts by weight of the fluoroelastomer continuous phase.

63. The process of claim 43, wherein the discontinuous phase comprises at least about 25 percent by volume of the fusing surface layer.

64. A process for fusing toner residing on a substrate to the substrate, the process comprising transmitting heat to the toner, and also comprising contacting the toner with the fusing surface layer of a fuser member comprising:

- (a) a base; and
- (b) a fusing surface layer comprising:
 - (i) a fluoroelastomer continuous phase; and
 - (ii) a discontinuous phase dispersed through the fluoroelastomer continuous phase in the form of domains;

wherein, at the temperature of the fusing process:

- the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase; and

- the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great;

- the viscosity of the toner is sufficiently high;

and

- the modulus of the discontinuous phase is sufficiently low; and

wherein the discontinuous phase comprises one or both of:

- at least a minimum proportion by volume of the fusing surface layer; and

- at least a minimum proportion by weight of the fluoroelastomer continuous phase;

so that the image generated in the process has a gloss number of about 5 or less;

the amount of heat transmitted to the toner being sufficient to fuse the toner to the substrate, and insufficient to raise the gloss number of the image above about 5 or less.

65. The process of claim 64, wherein at the equilibrium surface of the fusing surface layer:

- (a) the modulus of the fluoroelastomer continuous phase is greater than the modulus of the discontinuous phase at the temperature of the fusing process;

- (b) the difference between the modulus of the fluoroelastomer continuous phase and the modulus of the discontinuous phase is sufficiently great at the temperature of the fusing process;

- (c) the modulus of the discontinuous phase is sufficiently low at the temperature of the fusing process; and

NO.10161.S07
PAT00007.S07

- (d) the discontinuous phase comprises one or both of:
 - (i) at least a minimum proportion by volume of the fusing surface layer; and
 - (ii) at least a minimum proportion by weight of the fluoroelastomer continuous phase;
- so that the image generated in the process has a gloss number of about 5 or less.